

presenting both communications information and miscellaneous user information in two respective partial areas of the display unit.

Description of the Prior Art

Mobile communications terminals and mobile telephones have a display to 5 present different types of information. This information may, for example, relate to the mobile radio network operator, the battery level, the telephone number or text information transmitted during a communications link. In conventional mobile telephones, this display is designed in the form of a black-and-white liquid crystal display. More recent equipment already has, in some cases, a color graphics 10 display.

Due to advancing further development of existing mobile radio networks and the introduction of correspondingly more powerful mobile radio systems, mobile communications terminals are increasingly equipped with multimedia user facilities. Third-generation mobile radio systems are generally referred to by the 15 term UMTS (Universal Mobile Telecommunication System). Due to the development of UMTS, voice, graphics, video and other broadband services are intended to be combined with one another and offered to subscribers, with the aim of producing a worldwide, universal mobile radio standard. Thus, these communications services are intended to be offered to every subscriber, regardless 20 of his/her current location, the network in which the subscriber is currently located, or the terminal which the subscriber is currently using.

A substantial component of the desired UMTS mobile radio standard, which is to be introduced from 2001, is represented by the aforementioned implementation of multimedia user facilities; i.e., a comprehensive 25 and flexible range of services including voice, data and image transmission is to be provided. Videotelephony or Internet access, for example, are also intended to be provided.

However, corresponding mobile communications terminals must be equipped with color displays for multimedia user facilities of this type, although 30 these, even in non-illuminated mode, have a relatively high power consumption,

given that a power of several times 10 mW is required simply to refresh the color pixel matrix of such color displays. In any case, even in standby mode, or when no communications link exists, specific user information must be displayed to inform the user, for example, of a link to the mobile radio network operator or the battery 5 level of the mobile terminal, etc. The use of conventional color displays would, therefore, substantially reduce the standby time, whereas the aim is to prevent this.

The aforementioned problem could be eliminated by providing two different displays; a color display being used to present multimedia communications information and a conventional display being used to present the aforementioned 10 miscellaneous user and standby information. However, this solution would result in a disadvantageous increase in production costs and space requirement.

An object of the present invention is, therefore, to propose a mobile communications terminal in which the aforementioned problem is eliminated. In particular, a mobile communications terminal is to be created which, on the one 15 hand, is suitable for operation in mobile radio networks with multimedia user facilities and, on the other hand, minimizes power consumption for the presentation of corresponding information on a display of the mobile communications terminal.

SUMMARY OF THE INVENTION

Thus, according to the present invention, the display of the mobile 20 communications terminal is divided into two display areas. The first display area is provided for the presentation of (multimedia) communications information, and the second display area is provided exclusively for the presentation of miscellaneous user information which is displayed, in particular, when the terminal is in standby mode. The mobile communications terminal according to the present invention is 25 designed in such a way that, for the duration of the standby mode, or for the duration of an operating mode in which no multimedia communications information is to be presented, only the first display area provided for the presentation of miscellaneous user information is activated, whereas the display area provided for the presentation of communications information remains 30 deactivated.

The surface of the display area provided for the presentation of miscellaneous user information is advantageously small compared with the total display surface or the surface of the display area provided for the presentation of (multimedia) communications information. As such, in the absence of

5 communications information which is to be presented, the power consumption can be reduced according to this surface ratio. In particular, in the absence of communications information which is to be presented, only the display area provided for the presentation of miscellaneous user information is regularly refreshed.

10 The display is advantageously designed in the form of an alphanumeric, active-matrix liquid crystal color display.

With the aid of the present invention, high-resolution color displays (video displays) can be operated in a power-saving or energy-saving manner, since only a partial surface (for example, the upper, lower or lateral edge of the display) is made

15 available for the presentation of miscellaneous user information (e.g., status information), which does not correspond to multimedia communications information which is transmitted during a communications link to the mobile communications terminal. If the standby mode is ended and multimedia communications information is available and is to be presented on the terminal

20 display, the entire terminal display is refreshed and, in normal mode, the multimedia communications information is presented on one display area and the miscellaneous user information, e.g. the battery level or the like, is presented on the other display area.

Additional features and advantages of the present invention are described in,

25 and will be apparent from, the following Detailed Description of the Preferred Embodiments and the Drawings.

DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a simplified block diagram of a mobile communications terminal according to the teachings of the present invention;

Fig. 2a and Fig. 2b show presentations of the status of the display of the mobile communications terminal shown in Fig. 1 in standby mode and normal mode; and

5 Fig. 3 and Fig. 4 show display conditions in standby mode according to variants of the preferred embodiment explained with reference to Fig. 1 and Fig. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 shows a simplified block diagram of a preferred embodiment of a mobile communications terminal according to the present invention. This terminal includes an antenna 1, a transmit unit 2 and a receive unit 3, which collectively form the air 10 interface

of the terminal and are used to set up a communications link with a base station of the corresponding mobile radio network. The transmit and receive units 2 and 3 are connected to a frequency converter 5 and a unit 6 for digital signal processing of the communications information which is to be transmitted or received. A unit 7, which 15 acts as the interface between the mobile terminal and a user of the mobile terminal (man-machine interface), is connected to the unit 6. In particular, a keypad 8 and a microphone 9 are connected to the man-machine interface 7 to enter information, and also one connected to a loudspeaker 10 and a display 13 to output information. The display 13 is controlled by a display controller 11. A unit 4 is connected to the internal 20 structure of the mobile terminal to supply power to the entire mobile terminal. The unit 4 also may have a battery voltage regulator to maintain the supply voltage at a constant level. The aforementioned mobile terminal components, as shown in Fig. 1, correspond to the intrinsically customary components of conventional mobile telephones which, therefore, do not need closer examination at this point.

25 However, a special feature of the present invention is the design of the display 13, which is provided in particular in the form of a color display; for example, an active-matrix liquid crystal color display. The display 13 is designed in such a way that it serves not only to display multimedia communications information which is received by the receive unit 3, for example, in particular while 30 a communications link exists, but also to present miscellaneous user information

which is not communications information in the true sense and which, for example, provides information on specific conditions of the mobile terminal. For this purpose, the display surface of the display 13 is divided into two partial areas, the first partial area being provided exclusively for the visual presentation of the 5 aforementioned (multimedia) communications information, whereas the second partial area is provided in particular for the visual presentation of miscellaneous user and status information. The display controller 11 is designed according to the present invention in such a way that, if no communications information is to be presented (for example, in standby mode), it activates and regularly refreshes only 10 the aforementioned second partial area of the display surface 13 in order to present the aforementioned miscellaneous user information, whereas the first partial area provided for the presentation of communications information is deactivated. The first partial area remains deactivated until communications information to be presented occurs once more, having been obtained during a multimedia 15 communications connection (e.g., videotelephony, Internet retrieval). In this case, the entire display surface of the display 13 is activated and refreshed so that, in the present case, both the aforementioned user information and status information and the multimedia communications information are presented in the corresponding partial areas of the display 13. This will be explained in detail below with reference 20 to the presentations shown in Fig. 2.

Fig. 2a shows a typical structure of the display 13. The display 13 is particularly structured in the form of a matrix and includes a number of pixel lines 14, some of which are allocated to the partial area 16 for the presentation of multimedia communications information, while others are allocated to the partial 25 area 15 for the presentation of miscellaneous user and status information. Fig. 2a shows, in particular, the condition of the display 13 when the corresponding mobile communications terminal is in standby mode; i.e., it shows the case in which there is no multimedia communications information to be presented. In this case, only the pixel lines corresponding to the partial area 15 are activated and in cyclically 30 refreshed by the display controller 11 shown in Fig. 1, whereas the pixel lines of the

partial area 16 are deactivated. Here, it must be noted that pixels activated in the presentations shown in Figs. 2 through 4 are shown with hatching and deactivated pixels are shown as white.

If the user of the mobile communications terminal switches from standby mode to normal mode and sets up a communications connection via which the multimedia communications information which is to be presented on the display 13 is obtained, a normal refresh of the entire display 13 is carried out by the display controller 11, so that the entire display surface, i.e. the partial area 15 and the partial area 16, is available and activated for the display. Furthermore, the aforementioned status information can be presented in the partial area 15, whereas the multimedia communications information, such as graphics or images, are displayed in the partial area 16. It is likewise possible for communications information also to be presented in the partial area 15 which is actually provided for the status information, onto which communications information the status information also can be superimposed.

In the embodiment shown in Fig. 2, the partial area 15 provided for the presentation of miscellaneous user information and status information is disposed on the upper edge of the display 13. For visual clarity of the display 13, it is advantageous if this partial area 15 is generally provided in the circumstantial area of the display 13, whereby the partial area 15 also may be provided on the lower edge or on the lateral edge of the display 13. In order to minimize the power consumption in standby mode, it is advantageous to design the surface of the partial area 15 to be as small as possible compared with the entire display surface or the surface of the partial area 16, so that only a minimum display surface 15 of the display 13 needs to be operated if no multimedia communications information is available; i.e., if the partial area 16 of the display 13 is not in use.

Normal color display panels can be used for the display 13; i.e., no special developments are required. The display 13 is divided into the partial areas 15 and 16 and the individual pixels of these partial areas are controlled simply depending

on the display controller 11 shown in Fig. 1. This will be explained in detail below, where the control of the individual partial areas 15 and 16 of the display 13 can be implemented in two different ways.

The task of the display controller 11 shown in Fig. 1 is to process cyclically
5 the individual pixels of the display 13 and supply them with picture information. The functionality of the display controller 11 then can be adapted in such a way
that, in standby mode in which no multimedia communications information is
presented in the partial area 16, the display controller 11 processes only the pixels
of the partial area provided for the presentation of user information or status
10 information, as in the embodiment shown in Fig. 2, only the uppermost pixel lines
of the display 13 belonging to the partial area 15 being cyclically refreshed and
activated in standby mode. For this purpose, the display controller 11 may have an
internal line counter which is reset with each refresh cycle and counts the pixel
lines of the display 13 which are instantaneously being refreshed by the display
15 controller 11. As soon as the display controller 11 in standby mode, with reference
to the internal counter level, determines that a pixel line 14 of the display 13 is to
be refreshed or supplied with picture information which belongs to the partial area
16 of the display 13, this line is no longer processed by the display controller 11
and is, therefore, not supplied with picture information; i.e., the pixel lines 14
20 belonging to the partial area 16 of the display 13 remain dark. This procedure is
repeated with each refresh cycle.

Alternatively, it is also possible in a corresponding manner to connect the
display controller 11 externally to a counter 12, as shown by the broken line in Fig.
1. As such, in addition to the conventional chip of the display controller 11, a
25 control counter 12 is provided which also counts the pixel lines processed by the
display controller 11. Once the display controller 11 in standby mode has processed
the pixel lines belonging to the partial area 15, for example the first 20 pixel lines
of the display 13, it is disabled by the control counter 12. Similar to the first variant
described above, the remainder of the display 13, i.e. the pixel lines 14 belonging to
30 the partial area 16, are not processed in this case by the display controller 11, so

that these pixel lines are not supplied with picture information. In this case also, this procedure is repeated with each refresh cycle, whereby the counter level of the counter 12 is reset at the start of each refresh cycle.

The control of the display 13 is, of course, not restricted to the embodiment explained with reference to Fig. 2, in which entire pixel lines are allocated to the partial areas 15 and 16. It is also possible for a group of individual pixels of the display 13 to be allocated to the partial areas 15 and 16 without this group forming entire pixel lines. In this case, the display controller 11 and the counter 12 would have to be adapted compared with the above description in such a way that individual pixels of the matrix-type display 13, rather than entire pixel lines, are counted and monitored. As such, similar to the above procedure, on reaching a pixel allocated to the partial area 16, the processing of this pixel is suppressed by the display controller 11 so that no picture information is supplied to this pixel.

Thus, for example, the partial area 15 provided for the presentation of user information and status information can be disposed on a lateral edge of the matrix-type display 13 which is divided into pixel lines 14 and pixel columns 17. This embodiment is shown in Fig. 3.

It is similarly possible, for example, to allocate a group of pixels provided in a corner area of the display 13 to the partial area 15 for the presentation of user or status information. This embodiment is shown in Fig. 4.

Although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the invention as set forth in the hereafter appended claims.

25 **ABSTRACT OF THE DISCLOSURE**

A mobile communications terminal with a display unit which is divided into a first partial area for the exclusive presentation of multimedia communications information, and a second partial area for the presentation of miscellaneous user information. The display unit is controlled by a display controller in such a way that, in the absence of multimedia communications information, only the second